AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.116 - EXPEDITED PROCEDURE

Serial Number: 09/132,157

Filing Date: August 11, 1998
Tide: SILICON-GERMANIUM DEVICES FOR CMOS FORMED BY ION IMPLANTATION AND SOLID PHASE EPITAXIAL

REGROWTH

24. (Six times amended) A p-channel metal-oxide-semiconductor transistor formed on a silicon substrate, comprising:

a Si_{1-x}Ge_x channel region, having a germanium molar fraction of x, and formed in the substrate, underneath a silicon dioxide (SiO₂) gate oxide and between a source region and a drain region;

wherein x is less than or equal to 0.6, and wherein the Si_{1.x}Ge_x channel region forms a continuous Si_{1.x}Ge_x/SiO₂ gate oxide interface wherein no germanium oxide is present at the Si_{1.x}Ge_x/SiO₂ gate oxide interface as a result of ion implantation of germanium through the previously formed SiO₂ gate oxide.

25. (Five times amended) A p-channel metal-oxide-semiconductor transistor formed on a silicon substrate, comprising:

a Si_{1-x}Ge_x channel region, having a germanium molar fraction of x, and formed in the substrate, underneath a silicon dioxide (SiO₂) gate oxide and between a source region and a drain region, wherein x is less than or equal to 0.6, and wherein the Si_{1-x}Ge_x channel region forms a continuous Si_{1-x}Ge_x/SiO₂ gate oxide interface wherein no germanium oxide is present at the Si₁.

xGe_x/SiO₂ gate oxide interface as a result of ion implantation of germanium through the previously formed SiO₂ gate oxide; and

wherein the Si_{1-x}Ge_x channel region is formed from ion implanting germanium (Ge) into the substrate at a dose of approximately 2 X 10¹⁶ atoms/cm², and wherein the Ge is implanted at an energy of approximately 20 to 100 keV

28. (Six times amended) A p-channel metal-oxide-semiconductor transistor formed on a silicon substrate, comprising:

a Si_{1-x}Ge_x channel region, having a germanium molar fraction of 0.2, and formed in the substrate, underneath a silicon dioxide (SiO₂) gate oxide and between a source region and a drain region, wherein the Si_{1-x}Ge_x channel region forms a continuous Si_{1-x}Ge_x/SiO₂ gate oxide interface wherein no germanium oxide is present at the Si_{1-x}Ge_x/SiO₂ gate oxide interface as a result of ion implantation of germanium through the previously formed SiO₂ gate oxide.

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(Four times amended) A semiconductor transistor, comprising: 38.

- a silicon substrate:
- a silicon dioxide (SiO₂) gate oxide, coupled to the substrate;
- a gate, coupled to the SiO2 gate oxide;
- source/drain regions formed in the substrate on opposite sides of the gate; and
- a $Si_{1-x}Ge_x$ channel region, having a germanium molar fraction of x, and located underneath the SiO₂ gate oxide and between the source/drain regions, wherein x is less than or equal to 0.6, and wherein the Si_{1-x}Ge_x channel region forms a continuous Si_{1-x}Ge_x/SiO₂ gate oxide interface wherein no germanium oxide is present at the Si, Ge,/SiO, gate oxide interface as a result of ion implantation of germanium through the previously formed SiO, gate oxide.
- (Four times amended) A semiconductor transistor formed on a silicon substrate, 40. comprising:
- a Sil-xGex channel region, having a germanium molar fraction of 0.2 formed in the substrate, underneath a silicon dioxide (SiO2) gate oxide and between a source region and a drain region, wherein the Si_{1-x}Ge_x channel region forms a continuous Si_{1-x}Ge_x/SiO₂ gate oxide interface wherein no germanium oxide is present at the Si₁ Ge_x/SiO₂ gate oxide interface as a result of ion implantation of germanium through the previously formed SiO₂ gate oxide.
- (Thrice amended) A semiconductor transistor formed on a silicon substrate, comprising: 41. a Sil-Ge, channel region, having a germanium molar fraction of x, and formed in the substrate, underneath a silicon dioxide (SiO2) gate oxide and between a source region and a drain region, wherein x is less than or equal to 0.6, and wherein the Si_{1-x}Ge_x channel region forms a continuous Si_{1-x}Ge_x/SiO₂ gate oxide interface wherein no germanium oxide is present at the Si_{1-x} Ge/SiO, gate oxide interface as a result of ion implantation of germanium through the previously formed SiO, gate oxide; and

wherein the Si_{1-x}Ge_x channel region is formed from ion implanting germanium (Ge) into the substrate at a dose of approximately 2 X 1016 atoms/cm2, and wherein the Ge is implanted at an energy of approximately 20 to 100 keV.